



FIGURE 18. Panels A and B show the South Nags Head shoreline hardened with sand bags. Loss of the beach has left houses in the surf zone. Severe lateral erosion has also resulted, thus jeopardizing adjacent access roads and houses. Photographs are by S. Riggs.

hardened structures (Fig. 13), eight of which pre-date the 1985 no-hardening rule. The three structures constructed since 1985 required variances from the North Carolina state agencies. The rock jetty and rock revetment at Oregon Inlet were constructed to protect the bridge (Fig. 14). The third structure was a rock revetment constructed to protect the earthen-work Fort Fisher (Fig. 17).

The ban on hardened structures is increasingly challenged. Senate Bill S599, proposed in 2007 was an effort to open the door to inlet-stabilization with construction of terminal groins (jetties) along many of North Carolina's developed inlets. The island communities desiring to stabilize adjacent inlets are those with threatened houses located within the Inlet Hazard Zone of the NC Division of Coastal Management's Areas of Environmental Concern. The Inlet Hazard Zones are well defined areas that have historically, and often recently, been occupied by active inlets.

Sand Bag Hardening

Bulkheads composed of sand bags form a hardened shoreline similar to any rock, concrete, or steel bulkhead. As a result,

the beach in front of the bags is lost and erosion is increased on the adjacent beaches (Fig. 18). The North Carolina regulations allow sand bags to be used as a temporary, stop-gap measure providing the owner time to either participate in a community beach nourishment program, move the structure to a new location, or dismantle it.

However, the sand bag regulation has not been enforced and as a result there are many segments of the North Carolina ocean shoreline where houses and their septic tanks are in the surf zone (Fig. 18). Storms often expose and break septic tanks, which are rapidly repaired and reburied. They may continue to leak and contaminate the adjacent beaches and near-shore coastal waters. North Carolina recently (May, 2008) began to enforce the sand bag regulation with the requirement that all exposed sand bags that have been in place beyond the permitted time must be removed.

Beach Nourishment

To locate and define potential sand sources for beach nourishment projects requires extensive exploration programs. Since the best sand is already on the beach and